

Updating Output Emission Limitation Workgroup

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Cinergy Generation Mix

- Operate over 10,000 MW of coal fired capacity
- Over 3,500 MW of scrubbed capacity
- Almost 50% of coal capacity is higher efficiency super critical
- Expect to install SCR on most of our capacity to comply with the NOx SIP Call

Output Based Allocations

- Goal is to encourage energy efficiency in the production of electricity
- Can use gross or net power output
- Station auxiliary power consumption is the difference

Other Existing Incentives

- There are other very powerful drivers that encourage fuel efficiency
 - Fuel Cost (80% of variable costs)
 - Utility commission oversight
 - Competitive pressures
 - Minimize emissions and conserve allowances
- Output allocation process can work with these incentives

Selection of Gross Output

- Gross output is simpler to apply
- Will not penalize pollution control equipment
- Will capture the desired potential improvements that operators can control

Fuel Efficiency vs. Emissions

- Output emissions calculated from emission rate and heat rate
$$\frac{\text{lb. NO}_x}{\text{kW-hr}} = \frac{\text{lb. NO}_x}{\text{MMBtu}} \times \frac{\text{BTU}}{\text{kW-hr}}$$
- Improved fuel efficiency lowers emissions
- Reduced emissions rate lowers emissions

Measurement Concerns

- Gross power input to CEMs already exists
- Net power not always measured directly
- Auxiliary power often monitored in multiple locations
- Pollution control equipment not metered separately
- Some equipment shared between units

Auxiliary Power Usage

- Combustion air & flue gas fans
- Pollution control equipment
- Cooling water and condensate/feedwater pumps
- Fuel handling & preparation equipment
- Some equipment always operating

Pollution Control Equipment

- Allocation Process should not disadvantage use of pollution control equipment
- Additional power required to operate
 - SO₂ Scrubbers
 - Precipitators
 - NO_x controls
 - Cooling Tower pumps and fans

Effect of FGD Scrubber

Other Efficiency Considerations

- Age of generating unit
- Type of unit (ex. drum vs. super critical)
- Operating practices and conditions
- Capacity factor and need to follow customer load
- Generating units are most efficient at full load

Comparing New vs. Older Units

Gross HR Efficiency Losses

Critical non-electric efficiency variables

- Superheat and Reheat Steam Temperature
- Steam flow and pressure
- Condenser Back Pressure
- Steam/Water for Air Preheating
- Steam Attenuation
- Excess Air

Conclusions

- Gross output is the simplest to apply
- Gross electrical output is a CEMs input
- Utilizing a gross electricity output will incentivize the desired behavior
- Other incentives already are powerful motivators